

CLAIMS

What is claimed is:

1. A kneading element comprising:
 - a central portion defining a root diameter having a shaft receiving bore defined therein; and
 - at least one lobe extending radially from said central portion, said at least one lobe having an outer periphery ridge and first and second lateral sidewalls, wherein one of said lateral sidewalls of said at least one lobe is concave between said outer periphery ridge and said central portion.
2. The element of claim 1, wherein the other of said lateral sidewalls on each lobe is convex between said outer periphery ridge and said central portion.
3. The element of claim 1 wherein the other of said lateral sidewalls on each lobe is concave between said first outer periphery ridge and said central portion.
4. The element of claim 1, wherein said element includes two opposed lobes.
5. The element of claim 1, wherein said element includes three lobes.
6. The element of claim 1 wherein said element is twisted.
7. The element of claim 1, wherein said element has an axial depth greater than the diameter of the shaft receiving bore.
8. The element of claim 7, wherein said element is twisted.

9. A kneading block comprising a plurality of kneading elements, wherein at least one kneading element of said kneading block includes a central portion defining a root diameter having a shaft receiving bore defined therein, and at least one lobe extending radially from said central portion, said at least one lobe having an outer periphery ridge and first and second lateral sidewalls, wherein one of said lateral sidewalls of said at least one lobe is concave between said outer periphery ridge and said central portion.
10. The kneading block of claim 9, wherein the other of said lateral sidewalls on each lobe is convex between said outer periphery ridge and said central portion.
11. The kneading block of claim 9, wherein the other of said lateral sidewalls on each lobe is concave between said first outer periphery ridge and said central portion.
12. The kneading block of claim 9, wherein at least one kneading element includes two opposed lobes.
13. The kneading block of claim 9, wherein said kneading element includes three lobes.
14. The kneading block of claim 9, wherein at least one kneading element is twisted.
15. The kneading block of claim 9, wherein the block includes at least two kneading elements wherein one of the lateral sidewalls on at least one lobe is concave between said outer periphery ridge and said central portion.

16. The kneading block of claim 9, wherein the block comprises N number of kneading elements adjacent to each other, wherein all the elements have at least one lobe having first and second lateral sidewalls and wherein one of the lateral sidewalls on said at least one lobe is concave between said outer periphery ridge and said central portion.
17. The kneading block of claim 9, wherein the block comprises N number of kneading elements adjacent to each other, wherein at least the first element of the block has at least one lobe having first and second lateral sidewalls and wherein one of the lateral sidewalls on said at least one lobe is concave between said outer periphery ridge and said central portion.
18. The kneading block of claim 9, wherein the block comprises N number of kneading elements adjacent to each other, wherein at least the last element of the block has at least one lobe having first and second lateral sidewalls and wherein one of the lateral sidewalls on said at least one lobe is concave between said outer periphery ridge and said central portion.
19. The kneading block of claim 9, wherein the block comprises N number of kneading elements adjacent to each other, wherein at least the first and last elements of the block has at least one lobe having first and second lateral sidewalls and wherein one of the lateral sidewalls on said at least one lobe is concave between said outer periphery ridge and said central portion.
20. The kneading block of claim 16, wherein there are at least three kneading elements, and wherein the first and last kneading elements are twisted in a first direction and wherein the other elements are twisted in an opposite direction.

21. The kneading block of claim 16, wherein each element is twisted in the same direction.
22. A screw extruder comprising:
 - at least one modified conveying element having a particular, non-conventional, cross-sectional profile at at least one end of the conveying element; and
 - at least one kneading element contiguously aligned with and adjacent to the conveying element, wherein the kneading element has a cross-sectional profile peripherally congruent to the cross-sectional profile of the conveying element at an end adjacent to the conveying element.
23. The screw extruder of claim 22, wherein the screw extruder is a twin screw extruder and wherein both screws include at least one kneading element having a cross-sectional profile peripherally congruent to the cross sectional profile of a conveying element adjacent thereto.
24. The screw extruder of claim 22, wherein the screw extruder includes an S conveying element aligned and contiguous with an S kneading element such that the cross sectional profile of the S conveying element at one end thereof is peripherally congruent with a cross-sectional profile of the S kneading element at an adjacent end.
25. The screw extruder of claim 22, wherein the screw extruder includes an SS conveying element aligned and contiguous with an SS kneading element such that the cross sectional profile of the SS conveying element at one end thereof is peripherally congruent with a cross-sectional profile of the SS kneading element at an adjacent.

26. A screw having a configuration formed by a modified conveying element contiguous with a modified kneading element wherein a cross-sectional profile of said modified conveying element is peripherally congruent, aligned, and contiguous with a cross-sectional profile of said modified kneading element.
27. A modified kneading element that has a peripherally congruent cross-sectional profile when aligned and contiguous with a cross-sectional profile of a modified conveying element.